centre of gravity is O and mass is μ, on a very remote point P along $PO=d$, is $\frac{\mu}{d^2}+\frac{3}{2d^4}(A+B+C-3M)$, A, B, C being the three principal moments of inertia of the body, and M its moment about OP. And if McCullagh's ellipsoid of inertia be taken having O its centre, and its principal axes coinciding in direction with the principal axes of the body at O; and if a tangent plane to this ellipsoid perpendicular to OP at P′ touch it in R, it is shown that the component of the attraction of the body μ on P in a direction perpendicular to OP is parallel to RP′, and equal to $\frac{3\mu}{d^4}\times OP'\times P'R$.

Next comes the proposition, "if two confocal ellipsoids attract an external point, their two resultants are coincident in direction and proportional to their masses," the truth of which is very easily inferred from Ivory's theorem. This proposition is then employed in proving that the expressions already found for the attractions of a body of *any shape* on a very remote point hold true likewise for the attractions of *an ellipsoid* (whether it be homogeneous, or only composed of concentric ellipsoidal strata having the same principal axes, and any variable but small excentricities) on any external point, whether near or remote.

To apply these reasonings to the case of the earth, the ellipsoid is then supposed to become a spheroid, and the attracted point P is supposed on its surface; then $C=B$ and $M=B\cos^2\lambda+A\sin^2\lambda$, λ being the angle $OP(=d)$ makes with the equator; and so the central attraction along PO, viz. $\frac{\mu}{d^2}+\frac{3}{2d^4}(A+B+C-3M)$, then becomes $\frac{\mu}{d^2}+T(1-3\sin^2\lambda)$, where $T=\frac{3}{2d^4}(A-B)$: the attraction of the spheroid on P perpendicular to PO and urging P towards the equator is also easily shown to become $T\sin 2\lambda$.

Now that the point P may be at rest, it is necessary that the tangential component of the central force acting along PO should be equal to the sum of the tangential components of the centrifugal force (acting on P perpendicular to the earth's axis), and of the force perpendicular to PO; this condition gives an equation from which Clairaut's theorem follows instanter, due regard being had to the difference of the polar and equatorial gravities as determined by the general expression $\frac{\mu}{d^2}+T(1-3\sin^2\lambda)$, and the ellipticity of the exterior surface being supposed so small that its square and higher powers may be rejected.

7. "On the Change of Refrangibility of Light."—No. II. By Professor Stokes, M.A., F.R.S. Received June 16, 1853.

The principal object of this paper is to explain a mode of observation by means of which the author found that he could exhibit, with ordinary day-light, the change of refrangibility produced by substances opake as well as transparent, even when they possessed

only a low degree of sensibility. The method requires hardly any apparatus; it is extremely easy in execution; and it has the great advantage of rendering the observer independent of sun-light. On these accounts the author conceives that it might be immediately applied by chemists to the discrimination between different substances. The method is as follows:—

A large hole, which ought to be several inches in diameter, cut in the window-shutter of a darkened room, serves to introduce the light, and a small shelf, blackened on the top, attached to the shutter immediately underneath the hole, serves to support the objects to be examined, as well as one or two absorbing media. The hole is covered by an absorbing medium, called by the author the *principal absorbent*, which is so selected as to let through, as far as may be, the feebly illuminating rays of high refrangibility, as well as the invisible rays still more refrangible, but to stop the rays belonging to the greater part of the visible spectrum. A second medium, called by the author the *complementary absorbent*, is chosen so as to be as far as possible transparent with regard to those rays which the first medium stops, and opake with regard to those which it lets through. The object to be examined is placed on the shelf, and viewed through the second medium. If the media be well-selected, they together produce a very fair approach towards perfect darkness; and if the object appears unduly luminous, that arises in all probability from "fluorescence." To determine whether the illumination be really due to that cause, it is commonly sufficient to remove the complementary absorbent from before the eyes to the front of the hole, when the illumination, if it be really due to fluorescence, almost wholly disappears; whereas, if it be due merely to scattered light which is able to get through both media, it necessarily remains the same as before. In the case of objects which are only feebly fluorescent, it is sometimes better to leave the second medium in its place, and use a third medium, called by the author the *transfer medium*, which is placed alternately in the path of the rays incident on the object-end of the rays coming from it to the eyes.

Independently of illumination, the change of colour corresponding to the change of refrangibility, and the difference of colour with which the object appears, according as the transfer medium, or the complementary absorbent used as a transfer medium, is held in front of the eyes or in front of the hole, afford in most cases a ready mode of detecting fluorescence.

Instead of trusting to the *absolute* appearance of the object, it is commonly better to compare it with some fixed standard. The standard substance ought to be such as to scatter freely visible rays of all refrangibilities, but not to give out rays of one refrangibility when influenced by rays of another. The author employed a white porcelain tablet as such a standard; and the object to be observed was placed on the tablet, instead of being laid directly on the blackened shelf.

Another mode of observation consists in using a prism in combination with the principal absorbent. The object being placed on

the tablet, a slit is held close to it, in such a position as to be seen, projected partly on the object and partly on the tablet, and the slit is then viewed through a prism. The fluorescence of the object is evidenced by light appearing in regions of the spectrum, in which, in the case of the rays coming through the principal absorbent, and, therefore, in the case of the rays scattered by the tablet, there is nothing but darkness.

The author states that these methods proved to be of such delicacy, that, even on an unusually gloomy day, he was able readily to detect the fluorescence of white paper; and even in the case of substances standing much lower in the scale, the fluorescence could be detected in a similar manner.

In conclusion, the author states that he had found the property of fluorescence to belong to a peculiar class of salts, the platinocyanides, making a third instance in which this property had been connected with substances chemically isolated in a perfectly satisfactory way. The present instance opens a new field of inquiry in relation to the polarization of the fluorescent light.

8. "Researches in Embryology; a Note supplementary to Papers published in the Philosophical Transactions for 1838, 1839 and 1840, showing the confirmation of the principal facts there recorded, and pointing out a correspondence between certain structures connected with the Mammiferous Ovum and other Ova." By Martin Barry, M.D., F.R.S., F.R.S.E. Received May 27, 1853.

Referring to his account of the process of fecundation of the mammalian ovum and the immediately succeeding phenomena, published in various papers in the Philosophical Transactions, the author calls attention to the confirmation which his views have received from corresponding observations made by subsequent inquirers on the ova of other animals. He more particularly adverts to a recently published memoir by Dr. Keber, in which that physiologist describes the penetration of the spermatozoa into the interior of the ovum, in *Unio* and *Anodonta*, through an aperture formed by dehiscence of its coats, analogous to the micropyle in plants.

Small pellucid vesicles, lined with ciliated epithelium and enclosing a revolving mulberry-like object, such as the author discovered imbedded under the mucous membrane of the rabbit's uterus and described in the Philosophical Transactions for 1839, have been likewise observed by Keber, not only under the mucous membrane, but also and most frequently in some part of the cavity of the abdomen. Keber considers these bodies to be fecundated ova. The author agrees with Keber in considering them to be ova, but he does not suppose them to be fecundated, nor does he think that their membrane is the vitellary membrane ("zona pellucida"), which he believes to have been absorbed. He considers such ova to have been detached from the ovary along with their containing ovisac, which in their new situation constitutes the ciliated capsule, and as they present themselves in unimpregnated animals, he now believes that the formation of a mulberry-like group of cells from the germinal